

ADULT CARDIAC EMERGENCIES

Last Revised: 4/2020, Reviewed 2023

CARDIOPULMONARY ARREST

NOTE: High quality CPR includes:

1. Chest Compressions at a depth of at least 2 inches
2. Rate of compressions between 100-120 per minute
3. Allowing for complete chest recoil
4. Minimizing interruptions between cycles to less than 10 seconds (Compression fraction >60%)
5. Switching providers frequently ~ about every 2 minutes

FR/BLS TREATMENT:

1. Check airway, breathing and circulation.
2. If pulseless, begin high quality CPR and apply AED.
 - a. If the AED indicates "SHOCK ADVISED", call out "CLEAR!" check for the safety of others, and push the SHOCK button
 - b. Immediately resume CPR after defibrillation.
3. Ventilate with 100% oxygen.
4. Consider the need for Blind Insertion Airway Device per UNIVERSAL AIRWAY ALGORITHM
5. Follow current AHA BLS guidelines.
6. If patient has return of spontaneous circulation, refer to RETURN OF SPONTANEOUS CIRCULATION PROTOCOL
7. Initiate transport** Call for intercept per INTERCEPT CRITERIA

----ILS/ALS TREATMENT:

1. Continue FR/BLS TREATMENT.
2. Ensure HIGH QUALITY CPR at All times.
3. Refer to appropriate dysrhythmia protocol keeping the following in mind:
 - a. Rhythm checks, defibrillation and medications are completed at the top of the 2 minute cycle.
 - b. Compression fraction should be greater than 60% and ETCO2 greater than 10mmHg.
 - c. Consider placement of advanced airway per UNIVERSAL AIRWAY ALGORITHM.
4. If return of pulses, refer to RETURN OF SPONTANEOUS CIRCULATION PROTOCOL.
5. Initiate Transport**
6. Contact Medical Control

**** Only if transporting agency.**

CHEST PAIN (Acute Coronary Syndrome)

CRITERIA:

1. Chest pain consistent with cardiac ischemia; may include:
 - a. Respiratory difficulty
 - b. Nausea and vomiting
 - c. Diaphoresis
 - d. Dizziness
 - e. Epigastric, neck, jaw, or arm pain.
2. SBP > 90.

FR TREATMENT:

1. INITIAL MEDICAL CARE.
 2. Administer ASPIRIN 325mg or 81mg X 4 PO
 3. Relay information to incoming ambulance.
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BLS TREATMENT:

1. Continue **FR TREATMENT**.
 2. Perform 12-lead ECG within 10 minutes of patient contact and transmit to receiving hospital(if available).
 3. Administer ASPIRIN 325 mg PO or 81 mg x 4 PO.
 4. For apparent cardiac related chest pain with SBP>90, administer NITROGLYCERIN 0.4 mg SL.
 5. Repeat NITROGLYCERIN every 3-5 minutes to maximum of 3 doses as long as chest pain persists and SBP > 90.
 6. Call for intercept per INTERCEPT CRITERIA.
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ILS/ALS TREATMENT:

1. Continue **BLS TREATMENT**.
 2. NS at KVO or saline lock.
 3. Perform 12-lead EKG (if available) within 10 minutes of patient contact and transmit to receiving facility (if available). If dysrhythmia or ectopy present, proceed to appropriate protocol.
 4. If SBP > 90, apply NITROGLYCERIN PASTE, 1 inch, to patient's chest (*remove if SBP < 90*).
 5. If chest pain remains, administer MORPHINE SULFATE 2 mg slow IVP over 1 minute. May consider FENTANYL 1mcg/kg slow IVP over 2 minutes (maximum initial dose 100 mcg) instead of MORPHINE SULFATE.
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6. Medical Control may consider additional MORPHINE SULFATE 2-4 mg IVP every 5 minutes or additional FENTANYL 1 mcg/kg slow IVP.

STEMI – EMS Triage and Destination

Criteria:

1. Age > 18 years
2. Chest pain or equivalent symptoms consistent with cardiac ischemia or myocardial infarction.
 - a. i.e. “heartburn”/epigastric pain, palpitations, syncope, fatigue, shortness of breath, diaphoresis, ROSC post cardiac arrest.
3. STEMI criteria (12-lead ECG)
 - a. Computer interpretation of the 12-lead is STEMI (i.e. ***ACUTE MI***)
 - b. ST Segment elevation in ≥ 1 mm in 2 contiguous leads.
 - c. Interpretation of ECG transmitted and reviewed by a physician confirmed to be diagnostic of STEMI.

***If initial ECG is not diagnostic but suspicion remains high for ACS (acute coronary syndrome) and symptoms persist, obtain serial ECGs at 5-10 minute intervals.*

Goal: First medical contact to ECG is ≤ 10 minutes. Scene time ≤ 15 minutes.

BLS Treatment:

1. INITIAL MEDICAL CARE
 2. Notify receiving hospital of “STEMI ALERT” if patient meets above criteria.
 3. Refer to CHEST PAIN protocol
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ILS/ALS Treatment:

1. Continue FR/BLS Treatment
 2. Notify receiving hospital of “STEMI ALERT” if patient meets above criteria.
 3. Refer to CHEST PAIN protocol
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-----ALS Treatment:

1. Continue FR/BLS Treatment
2. Notify receiving hospital of “STEMI ALERT” if patient meets above criteria.
3. Refer to CHEST PAIN protocol

DESTINATION DETERMINATION

Transport time estimated to be ≤ 60 minutes

1. Notify medical control of STEMI and transport patient to the nearest PCI Capable Receiving Hospital via the most expedient method available.
 - a. Consider patient preference in deciding nearest PCI Capable Receiving Hospital
 - b. Consider air transport when appropriate.

2. Activate **“STEMI ALERT”** at receiving facility and transmit 12-lead ECG for provider confirmation.
3. If patient demonstrates Respiratory or Hemodynamic instability that may require immediate ED evaluation and treatment by a physician, proceed to the nearest appropriate facility.

Transport time estimated to be \geq 60 minutes

1. Notify medical control and consider transport to the closest appropriate non-PCI capable referring hospital and subsequent urgent transfer to a PCI Capable Receiving Facility.
2. Activate **“STEMI ALERT”** at receiving facility and transmit 12-lead ECG for provider confirmation.

ASYSTOLE / PEA

ILS TREATMENT:

1. Initiate HIGH QUALITY CPR and follow CARDIOPULMONARY ARREST Protocol.
 2. NS WO IV/IO.
 3. EPINEPHRINE 1:10,000 1 mg IV/IO* every 3-5 minutes as long as asystole or PEA persists. If epinephrine is not available, administer single dose of VASOPRESSIN 40 U
 4. Consider possible causes and treatments:
 - a. Hypovolemia (Volume infusion)
 - b. Hypoxia (Ventilation and oxygenation)
 - c. Massive Myocardial Infarction (Volume infusion)
 - d. Tension Pneumothorax (Needle decompression)
 - e. Acidosis/Hyperkalemia (Ventilation)
 - f. Drug Overdose (Refer to appropriate protocol)
 - g. Hypothermia (Refer to appropriate protocol)
 - h. Pericardial Tamponade (Rapid transport)
 - i. Massive Pulmonary Embolism (Ventilation, Volume infusion)
 6. Initiate transport** Call for intercept per INTERCEPT CRITERIA.
 7. Contact Medical Control.
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ALS TREATMENT:

1. Continue ILS TREATMENT.
 2. Consider possible causes and treatments:
 - a. Hypovolemia (Volume infusion)
 - b. Hypoxia (Ventilation and oxygenation)
 - c. Massive Myocardial Infarction (Volume infusion)
 - d. Tension Pneumothorax (Needle decompression)
 - e. Acidosis/Hyperkalemia (Hyperventilation, SODIUM BICARBONATE)
 - f. Drug Overdose (Refer to appropriate protocol)
 - g. Hypothermia (Refer to appropriate protocol)
 - h. Massive Pulmonary Embolism (Ventilation, Volume infusion)
 3. SODIUM BICARBONATE 50 mEq IV/IO for:
 - a. Known pre-existing hyperkalemia
 - b. Known overdose of Quinidine, tricyclic antidepressants, phenothiazines, antihistamines, beta blockers, cocaine
 - c. Return of spontaneous circulation after prolonged arrest interval
 4. If return of pulses, refer to the RETURN OF SPONTANEOUS CIRCULATION Protocol.
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5. Medical Control may order repeat SODIUM BICARBONATE every 10 minutes if rhythm persists

*** If administering medications by the endotracheal tube administer 2 - 2.5 times the IV dose.**

****Only if transporting agency**

ATRIAL FIBRILLATION/ATRIAL FLUTTER

STABLE:

CRITERIA:

1. Heart Rate > 150
2. QRS Complex < 0.12 seconds
3. SBP > 100

EXCLUSION:

1. Sinus Tachycardia
2. SBP < 90
3. Altered LOC
4. Chest pain
5. Respiratory difficulty
6. Pulmonary Edema / Acute CHF Exacerbation

ILS TREATMENT:

1. INITIAL MEDICAL CARE.
 - a. Obtain 12-Lead EKG - Transmit to Receiving Facility if abnormal (if available).
2. NS at KVO, or saline lock, AC if possible.

ALS TREATMENT:

1. Continue ILS TREATMENT.
2. Contact Medical Control.

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3. CARDIZEM 0.25mg/kg slow IV push over 2-5 minutes if SBP > 100. **(if available)**
 - a. (ACLS guidelines recommend 15 to 20 mg; Max dose 25mg)
 4. If A-fib or A-flutter persists after 15 minutes, consider CARDIZEM 0.35 mg/kg slow IV push over 2-5 minutes if SBP > 100.
 - a. (ACLS guidelines recommend 20 to 25 mg; Max dose 25mg)
 5. If responsive to CARDIZEM bolus, may start CARDIZEM maintenance infusion at 10-15 mg/hr.
 - a. CARDIZEM infusion: mix CARDIZEM 100 mg in 100 mL 0.9% Normal Saline to give you 1 mg/mL concentration.
 - b. Use 60 gtts IV set and 10-15 gtts/minute is equivalent to 10-15 mg/hr
 6. If patient converts, obtain a repeat 12-Lead EKG
 7. If A-fib or A-flutter persists, consider SYNCHRONIZED CARDIOVERSION
 - a. Consider sedation with VERSED 2 mg IV.
 - b. Synchronized cardioversion at 100J-200J-300J-360J or equivalent biphasic setting.

**** CONTRAINDICATIONS:**

- 2nd/3rd degree AV Blocks (may induce asystole)

- Known Wolff-Parkinson-White Syndrome (may increase heart rate)
- Known Sick Sinus Syndrome (may induce asystole)
- Hypotension

UNSTABLE:

CRITERIA:

1. Heart rate > 150
2. QRS Complex < 0.12 seconds
3. Serious signs or symptoms, including:
 - a. SBP < 90
 - b. Chest pain
 - c. Respiratory difficulty
 - d. Altered LOC
 - e. Pulmonary edema

ILS/ALS TREATMENT:

1. INITIAL MEDICAL CARE.
 2. NS at KVO, or saline lock, AC if possible.
 3. SYNCHRONIZED CARDIOVERSION, if available.
 - a. Consider sedation with VERSED 2 mg IVP.
 - b. Synchronized cardioversion at 100J-200J-300J-360J or equivalent biphasic setting.
 4. If cardioversion is successful obtain 12-Lead EKG – Do not need to send to receiving facility
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BRADYCARDIA

NOTE: If patient presents with Second Degree-Mobitz II or Third Degree Heart Block, apply external pacing pads immediately to anticipate onset of symptoms.

CRITERIA:

1. Heart rate < 60 with serious signs or symptoms, including:
 - a. SBP < 90
 - b. Chest pain
 - c. Respiratory difficulty
 - d. Altered LOC
 - e. Pulmonary edema
 - f. Signs or symptoms of shock

ILS TREATMENT:

1. INITIAL MEDICAL CARE.
2. NS at KVO; if lungs clear and SBP < 90, consider 500 ml fluid bolus.
3. ATROPINE 0.5 mg IVP every 3-5 minutes, as long as symptomatic bradycardia persists, to a total dose of 3mg.
4. If no response to ATROPINE, consider EXTERNAL PACING, if available.
5. Consider sedation with VERSED 2 mg IVP; repeat in 5 minutes as needed to maintain sedation throughout procedure.

ALS TREATMENT:

1. Continue ILS TREATMENT
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2. Medical Control may consider DOPAMINE at 5 mcg/kg/min titrated to a SBP of 90-100 or MAP of > 65..

CARDIOGENIC SHOCK

CRITERIA:

1. Signs of cardiac insufficiency, including:
 - a. Chest pain
 - b. Respiratory difficulty
 - c. Pulmonary edema
 - d. SBP < 90

ILS TREATMENT:

1. INITIAL MEDICAL CARE.
 2. If dysrhythmia present, proceed to appropriate protocol.
 3. NS at KVO, or saline lock if pulmonary edema is present.
 4. If lung sounds are clear, consider fluid bolus 500 ml NS. Titrate to maintain SBP between 90-100 or MAP > 65. 5. Call for intercept per INTERCEPT CRITERIA.
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ALS TREATMENT:

1. Continue ILS TREATMENT.
 2. If SBP < 65 despite ILS care, administer DOPAMINE at 5 mcg/kg/min titrated to a SBP of 90-100 or MAP of > 65.
 - a. See Dopamine Drip Chart
 3. If signs of pulmonary edema and SBP > 90 or MAP > 65 with DOPAMINE, consider CPAP application.
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CHF/PULMONARY EDEMA

CRITERIA:

1. Respiratory difficulty
2. Rales
3. SBP > 90 or MAP > 65 4. HR >60 or < 65 (refer to CARDIOGENIC SHOCK protocol)

ILS/ALS TREATMENT:

1. INITIAL MEDICAL CARE.
 - a. Obtain 12-Lead EKG – Transmit to receiving facility if abnormal (if available)
 2. If SBP > 90 or MAP > 65:
 - a. Adminster NITROGLYCERIN 0.4 mg SL x1
 - b. Apply CPAP
 - c. Apply 1 inch of NITROGLYCERIN PASTE to patient's chest (remove if SBP < 90 or MAP < 65)
 - d. Consider additional NITROGLYCERIN 0.4 mg SL every 5 minutes x 2 doses
 - If CPAP is already applied, do not remove CPAP to administer NITRO
 3. NS at KVO, or saline lock.
 4. If wheezing is present and if ETCO2 waveform supports concurrent bronchospasm (if available) refer to BRONCHOSPASM/ASTHMA/COPD Protocol.
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5. Medical Control may consider MORPHINE SULFATE 2-4 mg

POST CARDIAC ARREST COOLING

NOTE: Mild to moderate hypothermia (32-36 degrees C) has been shown to improve overall survival from cardiac arrest and to improve neurologic outcomes in several studies following certain types of cardiac arrest.

NOTE: Do not initiate this protocol unless the receiving facility will continue induced hypothermia.

CRITERIA:

1. Age >18
2. Resuscitation started within 15 minutes of collapse
3. Return of spontaneous circulation with persistent coma (GCS ≤ 8)

EXCLUSIONS:

1. Coma secondary to medications (i.e. overdose), witnessed seizure, trauma
2. Pregnancy

FR/BLS TREATMENT:

1. Apply ice packs to bilateral neck, groin and axillae. Change ice packs every 15 minutes or more frequently as necessary.
2. Do not allow patient to shiver.
3. Do not hyperventilate.
4. Initiate transport** Call for intercept per INTERCEPT CRITERIA.
5. Contact Medical Control

ILS TREATMENT:

1. Continue FR/BLS TREATMENT.
2. Do not allow patient to shiver. May use VERSED 0.05 mg/kg IVP q 3-5 minutes up to a total of 3 doses or maximum 10 mg as needed. 3. Monitor ETCO₂, if available; target 35-40 mmHg.

ALS TREATMENT: 1. Continue ILS TREATMENT. 2. If needed, administer DOPAMINE at 15gtts/min to maintain SBP at 130-150.

*****Only if transporting agency.**

RETURN OF SPONTANEOUS CIRCULATION

NOTE: A sharp increase in ETCO₂ Capnography may indicate ROSC. A sharp decrease in ETCO₂

CRITERIA:

1. Return of palpable pulses after Resuscitation.

FR/BLS TREATMENT:

1. Reassess Airway, Breathing and Circulation.
 - b. If ventilation assistance is required, ventilate at 10-12 breaths per minute.
 - c. Do not hyperventilate.
 - d. Titrate to maintain oxygen saturations \geq 94%.
2. Provide **INITIAL MEDICAL CARE**.
3. Consider **POST CARDIAC ARREST COOLING**.
4. Initiate transport** Call for intercept per INTERCEPT CRITERIA.
5. Reassess patient. If patient becomes pulseless, begin CPR and follow **CARDIOPULMONARY ARREST** Protocol.

ILS TREATMENT:

1. Continue **FR/BLS TREATMENT**.
2. Obtain 12 Lead EKG, and transmit to receiving facility, if available.
3. Treat hypotension (SBP < 90 or MAP < 65) according to SHOCK Protocol with NS IV fluids.
4. Monitor ETCO₂, if available. Target 35-40mmHg.
5. Consider placement of advanced airway per UNIVERSAL AIRWAY ALGORITHM.
6. Initiate transport**

ALS TREATMENT:

1. Continue **ILS TREATMENT**.
2. If hypotension persists despite fluid administration, administer DOPAMINE at 5mcg/kg/min to achieve SPB > 90-100 or MAP > 65, per SHOCK Protocol.
 - a. See Dopamine Drip Chart
3. Initiate transport**

**** Only if transporting agency.**

TACHYARRHYTHMIA – STABLE

CRITERIA:

1. Heart rate > 150
2. SBP > 90 or MAP > 65
3. Regular ventricular heart rate.
4. Monomorphic 1. If irregular ventricular heart rate see **ATRIAL FIB/ATRIAL FLUTTER PROTOCOL**.

EXCLUSION:

1. If irregular ventricular heart rate see **ATRIAL FIB/ATRIAL FLUTTER PROTOCOL**

ILS TREATMENT:

1. **INITIAL MEDICAL CARE** a. Obtain 12-Lead EKG – Transmit to receiving facility if abnormal (if available)
2. NS at KVO
3. Perform modified valsalva maneuvers**.
4. ADENOSINE 6 mg rapid IVP followed by a 20 ml NS flush.
5. If no change in rhythm, ADENOSINE 12 mg rapid IVP followed by a 20 ml NS flush.
6. If no change in rhythm and **narrow** QRS complexes, contact Medical Control. a. If underlying rhythm is Atrial Fibrillation or Atrial Flutter refer to ATRIAL FIBRILLATION/ATRIAL FLUTTER Protocol.
7. If no change in rhythm and **wide** QRS complex, administer AMIODARONE 150mg IVP. May repeat AMIODARONE every 5-10 minutes till wide complex tachycardia resolves to a maximum dose of 450mg.
8. For patients with allergy or no response to AMIODARONE, consider LIDOCAINE 1.5 mg/kg IVP. May repeat every 3-5 minutes at 0.75 mg/kg to maximum of 3 mg/kg.
9. If tachycardia resolves with LIDOCAINE bolus, administer LIDOCAINE infusion at 2-4 mg/min.

ALS TREATMENT:

1. Continue **ILS TREATMENT**.
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2. Medical Control may order additional ADENOSINE 12 mg rapid IVP followed by a 20 ml NS flush.
 3. Medical Control may order MAGNESIUM SULFATE 2 grams for polymorphic tachycardia, suspect hypomagnesemia or digitalis toxicity.

****Modified Valsalva Maneuver**

1. Have patient blow through a 10 cc syringe in a semi recumbent position for 15 seconds
2. Lay patient flat and lift their legs to 45 degrees for 15 seconds
3. Return patient to the semi recumbent position for 45 seconds before reassessing cardiac rhythm

TACHYARRHYTHMIA – UNSTABLE

CRITERIA:

1. Heart rate > 150
2. Serious signs or symptoms, including:
 - a. SBP < 90 or MAP < 65
 - b. Chest pain
 - c. Respiratory difficulty
 - d. Acutely altered LOC
 - e. Pulmonary edema
 - f. Signs or symptoms of shock

ILS/ALS TREATMENT:

1. **INITIAL MEDICAL CARE.**
 2. If altered LOC, immediate SYNCHRONIZED CARDIOVERSION at 100J or equivalent biphasic setting.
 3. NS at KVO.
 4. If normal LOC, consider sedation with VERSED 2 mg IVP before SYNCHRONIZED CARDIOVERSION.
 5. If no response to initial energy dose, repeat SYNCHRONIZED CARDIOVERSION at 200J-300J-360J or equivalent biphasic setting as needed.
 6. If tachycardia persists contact Medical Control.
 7. If cardioversion is successful obtain 12-Lead EKG.
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VENTRICULAR ECTOPY

NOTE: Assumes cardiac chest pain protocol is already initiated.

NOTE: Never treat third degree heart block, idioventricular rhythm or ventricular escape beats with Antidysrhythmics.

CRITERIA:

1. Chest pain consistent with cardiac ischemia
2. Heart rate > 60
3. SBP > 90 or MAP > 65
4. No treatable cause (i.e. hypoxia)
5. Premature Ventricular Complexes, including:
 - a. > 6 PVCs per minute
 - b. Couplets
 - c. Salvos or runs of V-tach
 - d. R on T phenomenon
 - e. Multifocal PVC's

ILS / ALS TREATMENT:

1. **INITIAL MEDICAL CARE.** a. Obtain 12-Lead EKG and transmit (if available).
 2. Administer AMIODARONE 150 mg IVP. May repeat AMIODARONE dose every 5-10 minutes until PVCs resolve or a total of 450 mg has been administered.
 3. May consider LIDOCAINE 1.5 mg/kg (if no response to AMIODARONE or if the patient is allergic to AMIODARONE). May repeat LIDOCAINE 0.75 mg/kg every five minutes to a maximum cumulative dose of 3 mg/kg.
 4. If rhythm converts after LIDOCAINE bolus, administer LIDOCAINE infusion at 2-4 mg/min.
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V-FIB/PULSELESS V-TACH

ILS TREATMENT:

1. Continue high quality CPR per CARDIOPULMONARY ARREST Protocol
2. Continue defibrillation at 360J or equivalent biphasic shock or as directed by AED every 2 minutes.
3. EPINEPHRINE (1:10,000) 1.0 mg IV/IO q 3-5 minutes as long as patient remains pulseless. If epinephrine is not available, administer single dose VASOPRESSIN 40 U.
4. For V-fib/pulseless V-tach refractory to defibrillation administer AMIODARONE 300 mg IV/IO; may repeat at 150 mg IV/IO in 5 minutes if needed.
5. If V-Fib or V-Tach persists or patient is allergic to AMIODARONE, consider LIDOCAINE 1.5 mg/kg IVP. May be repeated once at 1.5 mg/kg in 5 minutes.
6. If V-fib, V-tach is resolved with LIDOCAINE bolus, administer LIDOCAINE infusion at 2-4 mg/min.
7. If refractory VF or pulseless VT after 3 defibrillations, perform dual sequential defibrillation (DD) if a second manual defibrillator is available* One of the defibrillators may be an AED.
8. Apply a new set of defibrillation pads so that there is one set in the anterior/posterior orientation and another set in the anterior/apical orientation. Ensure that the pads do not touch each other.
9. Assure controls for both defibrillators are available to the code leader, the code leader with confirm the rhythm.
10. If a shockable rhythm is present, immediately resume CPR. Code leader will then charge both defibrillators to maximum energy.
11. After ensuring that everyone is clear from the patient, the code leader will push the shock buttons **one right after the other** .
12. Check rhythm, Resume CPR if indicated.
13. Continue to use dual sequential defibrillation for the remainder of the code instead of single defibrillation.
14. Non-shockable rhythms will be treated according to the appropriate protocol.
15. If Return of Spontaneous Circulation is achieved refer to ROSC Protocol.
16. Initiate transport** Call for intercept per INTERCEPT CRITERIA.
17. Contact Medical Control.

ALS TREATMENT:

18. Continue **ILS TREATMENT**.
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19. Medical Control may order MAGNESIUM SULFATE 2 grams for polymorphic tachycardia, suspect hypomagnesemia, or digitalis toxicity.

***Check with your device manufacturer to see if they recommend an inspection by bio-med after a unit is used in this manner.**

**** Only if transporting agency.**

VAD (Ventricular Assist Device)

NOTE: Pulse may not be palpable, manual blood pressure often cannot be measured, and pulse oximetry may be unreliable. The patient's automated blood pressure will usually be hypotensive and pulse pressure will be narrow.

CRITERIA:

1. Presence of a left, right, or bilateral ventricular assist device
2. Serious signs or symptoms, including:
 - a. Respiratory difficulty
 - b. Pulmonary edema
 - c. Chest pain
 - d. Signs or symptoms of shock
 - e. Potentially lethal dysrhythmia
 - f. Altered LOC/ syncope

FR/BLS TREATMENT:

1. INITIAL MEDICAL CARE.
 2. Call for intercept per INTERCEPT CRITERIA.
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ILS/ALS TREATMENT:

1. Continue **FR / BLS TREATMENT**.
 2. If stable, follow appropriate **ILS/ALS** protocol.
 3. Auscultate heart. Continuous whirling noise indicates VAD is working, but even a carotid pulse may not be palpable.
 4. Monitor ECG. If there is a pulse, the rhythm may not correlate with it.
 5. NS KVO or saline lock.
 6. If patient is dehydrated and lungs are clear administer 250 ml fluid bolus over 10 minutes. May repeat once, up to a total of 500ml or until MAP > 65 mmHg.
 7. Obtain 12 lead ECG. Follow appropriate protocol if STEMI or dysrhythmia present.
 8. Be sure patient brings back up power sources (batteries, charger, etc.), and hand pump (if applicable).
 9. Strongly consider transporting a VAD knowledgeable family member with patient.
 10. Inspect VAD control for model name and alarms. Use color code for atlas. Controller will usually be located at the waist.
 11. For VAD alarms or VAD malfunction, please see VAD Emergency Care Guidelines
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VAD (Ventricular Assist Device)

VAD atlas: http://www.mylvad.com/assets/ems_docs/2013-field-guide.pdf

SPECIFIC SITUATIONS:

1. If VAD is alarming, follow manufacturer's instructions or look at VAD atlas. Attempt to contact VAD Specialist via manufacturer's phone number (on machine or wallet card).
2. "Low flow alarm" states are usually improved by NORMAL SALINE IV 250ml bolus, up to 500ml. Monitor for signs of CHF.
3. If there is a potentially lethal dysrhythmia, follow appropriate ILS/ALS protocol. Do not detach or power off VAD. All VADs can be left on for defibrillation, cardioversion, and external pacing.
 - a. For HeartMate XVE, keep current < 40 mA.
 - b. For Thoratec PVAD w/ TLC II the need to pace is very rare since it is a BiVAD.
4. **CPR should NOT be performed on patients with Thoratec PVAD w/ TLC II.**
5. If indicated, CPR may be performed on patients with: HeartWare HVAD, VentrAssist LVAD, HeartMate II, or Jarvik 2000 FlowMaker.
6. If a VAD that features a hand pump (HeartMate XVE, or Thoratec PVAD w/ TLC II) loses power or the motor fails and there is no flow on meter and no normal machine sound over the precordium, hand pumping is indicated. The hand pumping rate should be 60 to 90/minute. Foot pumping is acceptable.

Appendix

DOPAMINE DRIP CHART

*Dopamine is provided premixed (400mg in 250mL D5W or 800mg in 500mL D5W).
This yields a concentration of 1600mcg/mL.*

Dosage mcg/kg/min	1	1.5	2	2.5	3	3.5	4	5	6	7	8	9	10	15	20
Body weight (lbs & kg)	FLOW RATE IN ML/HR (In the absence of an IV pump, use minidrip tubing and ml/hr = drops/minute)														
22lb/10kg	1	1	1	1	1	1	2	2	2	3	3	3	4	6	8
33lb/15kg	1	1	1	2	2	2	2	3	3	4	5	5	6	8	11
44lb/20kg	1	1	2	2	2	3	3	4	5	5	6	7	8	11	15
55lb/25kg	1	1	2	2	3	3	4	5	6	7	8	8	9	14	19
66lb/30kg	1	2	2	3	3	4	5	6	7	8	9	10	11	17	23
77lb/35kg	1	2	3	3	4	5	5	7	8	9	11	12	13	20	26
88lbs/40kg	2	2	3	4	5	5	6	8	9	11	12	14	15	23	30
99lbs/45kg	2	3	3	4	5	6	7	8	10	12	14	15	17	25	34
110lbs/50kg	2	3	4	5	6	7	8	9	11	13	15	17	19	28	38
121lbs/55kg	2	3	4	5	6	7	8	10	12	14	17	19	21	31	41
132lbs/60kg	2	3	5	6	7	8	9	11	14	16	18	20	23	34	45
143lbs/65kg	2	4	5	6	7	9	10	12	15	17	20	22	24	37	49
154lbs/70kg	3	4	5	7	8	9	11	13	16	18	21	24	26	39	53
165lbs/75kg	3	4	6	7	8	10	11	14	17	20	23	25	28	42	56
176lbs/80kg	3	5	6	8	9	11	12	15	18	21	24	27	30	45	60
187lbs/85kg	3	5	6	8	10	11	13	16	19	22	26	29	32	48	64
198lbs/90kg	3	5	7	8	10	12	14	17	20	24	27	30	34	51	68
209lbs/95kg	4	5	7	9	11	12	14	18	21	25	29	32	36	53	71
220lbs/100kg	4	6	8	9	11	13	15	19	23	26	30	34	38	56	75
231lbs/105kg	4	6	8	10	12	14	16	20	24	28	32	35	39	59	79
242lbs/110kg	4	6	8	10	12	14	17	21	25	29	33	37	41	62	83
253lbs/115kg	4	6	9	11	13	15	17	22	26	30	35	39	43	65	86
264lbs/120kg	5	7	9	11	14	16	18	23	27	32	36	41	45	68	90

Appendix

12-Lead EKG

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral
SITE		FACING	
SEPTAL	V1, V2	NONE	
ANTERIOR	V3, V4	NONE	
ANTEROSEPTAL	V1, V2, V3, V4	NONE	
LATERAL	I, aVL, V5, V6	II, III, aVF	
ANTEROLATERAL	I, aVL, V3, V4, V5, V6	II, III, aVF	
INFERIOR	II, III, aVF	I, aVL	
POSTERIOR	NONE	V1, V2, V3, V4	